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SCIENCE NEWS LETTER

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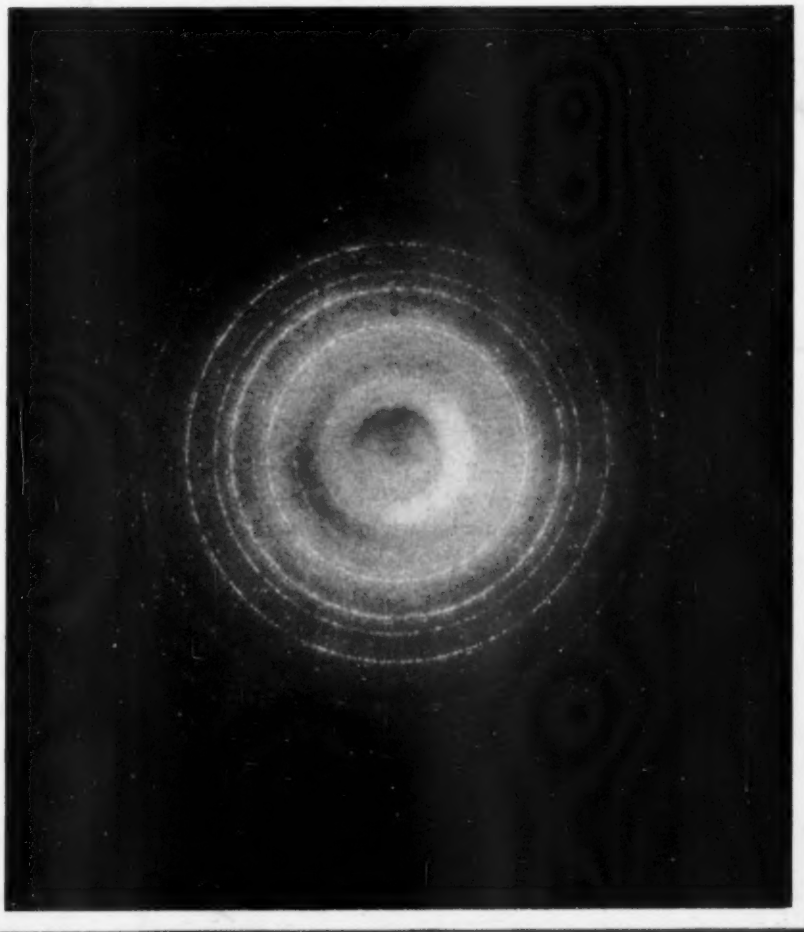
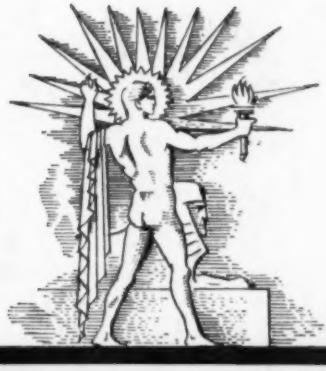
THE WEEKLY SUMMARY OF CURRENT SCIENCE •





July 11, 1942

Pattern from Electrons

See Page 21

A SCIENCE SERVICE PUBLICATION

Do You Know?

Adult *mosquitoes* may travel as far as 15 miles.

When Sanskrit was a living language the *sun* had 37 names.

Nearly 2,000 species of plants yield useful *fibers* and fibrous materials.

A single blast furnace has set a world's record by producing 43,000 tons of *iron* in one month.

A *cow* must be trained to back away from an electric fence; her impulse is to jump through it.

Perspiration won't interfere with the vision of surgeons who have adopted new cellulose sponge *brow bands*.

The world's first *copper mine* was operated by the Egyptian king, Snefru, 5,000 years ago on the peninsula of Sinai.

Constant warfare must be waged against *insects* which attack the vast quantities of foods stored to feed America's Army.

Predicting *storms* is the goal of Russian scientists who have set up a hydrophysical station on the Black Sea, to study behavior of waves and currents in the salt-water body.

A *salvage bell* for submarine crews, based in design on the American bell which has been tested in Navy rescue work, is owned by Sweden and is the only one of its kind in Europe.

There are approximately four ounces of table *salt* in the human body.

An acre of *buckwheat* in flower may supply enough nectar for bees to make 100 to 150 pounds of honey.

Japanese beetles prefer yellow; traps painted that color captured 50% more beetles than standard green and white traps.

Plastic discs about the size of a nickel have been designed to give the maximum *reflection* of light from minimum candlepower—they are for wear on belts, lapels or shoes during blackouts.

Single *Chinese radishes* may weigh as much as 10 pounds.

A *combat tire* must be able to run, even when flat, at a speed of 50 miles an hour.

The now-extinct *elephant birds* of Madagascar were the largest birds that ever existed, individuals sometimes reaching a height of eleven feet.

Bronchoscopes, surgical instruments used to remove safety pins from babies' bronchial tubes, are used also these days to find imperfections in airplane engine oil lines.

Question Box

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Most articles which appear in* SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.

SCIENCE NEWS LETTER

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MEDICINE

Sulfa Drug Control of Colds Hinted in Report of Tests

Treatment With Sulfadiazine Causes Improvement in Most of Group of Children in One Type of Infection

HOPE that with the aid of the sulfa drugs we might get through next winter and succeeding winters with fewer bad colds, attacks of bronchitis and pneumonia, appears in a report by Dr. Morris Siegel, of New York (*Journal, American Medical Association,* July 4).

Sulfadiazine, given on the very first day a sore throat or other symptoms of a cold appear, can apparently speed recovery and prevent the cold from developing into pneumonia or into an attack of bronchitis severe enough to keep the patient in bed or maybe send him to the hospital.

Dr. Siegel gave this treatment, during an epidemic last winter, to a group of feebleminded children who were particularly susceptible to colds and other infections of nose, throat and lungs. As controls, one-half of the children in each of the same two cottages at Letchworth Village were not given the sulfadiazine treatment the first day they showed symptoms, although all of them were given such ordinary care as their symptoms required.

"Most of the patients receiving sulfadiazine improved after 24 hours," Dr. Siegel reports. "A few had a secondary rise in temperature within 72 hours after premature withdrawal of the drug and some showed no evidence of improvement.

"For the first 12 hours after treatment was begun there was often no perceptible difference between the treated and control cases. Within 24 to 36 hours, however, there were usually signs of improvement in the treated group. The temperature fell and remained low. The patient appeared less toxic. His appetite returned and he was no longer restless and apathetic but brighter and more cheerful. Signs of infection, such as coryza (running nose) and cough, still persisted in many cases but the infection appeared to be subsiding, as if the inflammation had abruptly passed the acute stage."

During a second epidemic of a milder kind of infection, the sulfadiazine treatment did not seem to have much effect. This, Dr. Siegel believes, is probably because the second kind of infection was caused by a virus, which was not susceptible to the action of sulfadiazine.

This suggests that effective control of colds, bronchitis and the like by sulfa drug treatment would depend on whether or not they were caused by germs of the kind that can be overcome by the drugs. Since germs of this kind are believed to be the cause of many of the worst symptoms of colds and the reason for colds lasting so long and so frequently ending in pneumonia, the chances seem bright for the sting of the common cold being drawn by the sulfa drugs.

Science News Letter, July 11, 1942

PSYCHOLOGY

Muscle of Ear Acts To Protect Against Noise

MEN subjected to the din of mechanized warfare or the crashes and shrieks of war production may have their ears protected by nature with "built-in" ear defenders.

A muscle of the ear, the stapedius muscle, which acts to rock that bone in the ear that looks like a horse's stirrup, serves as a damping agent to protect the inner ear against excessive noise. This was learned in animal experiments conducted by Drs. Ernest Glen Wever and Charles W. Bray, at Princeton Univer-

LIGHTNING DID THIS

The holes in this ball were made by lightning during the seven years that the ball rested on top of an 878-foot antenna tower in Nashville, Tenn. From the size of the hole, the amount of electricity contained in the stroke can be calculated. It is surprisingly small. The stroke that produced the biggest hole, nearly an inch in diameter, contained only enough electricity to light a 40-watt lamp about 80 seconds. The holes are being examined by Dr. Karl B. McEachron, left, and J. H. Hagenguth of the General Electric High Voltage Laboratory, who devised the calculations.

sity (*Journal of Experimental Psychology*, July).

This function of the stapedius muscle may be partly the explanation of why you become temporarily deafened, especially to conversational tones, while you are exposed to loud noise like that of an airplane engine or a boiler factory.

Not only does tension of this muscle reduce the sensitivity of the ear to all noise, but it acts differentially to reduce the response more to low tones than to high ones. A peculiarity of its action is that for certain tones of middle range, a slight tension of the muscle actually improves the hearing.

This would seem to indicate a minimum amount of noise may aid the hearing of some tones, such as those used in speech.

Science News Letter, July 11, 1942

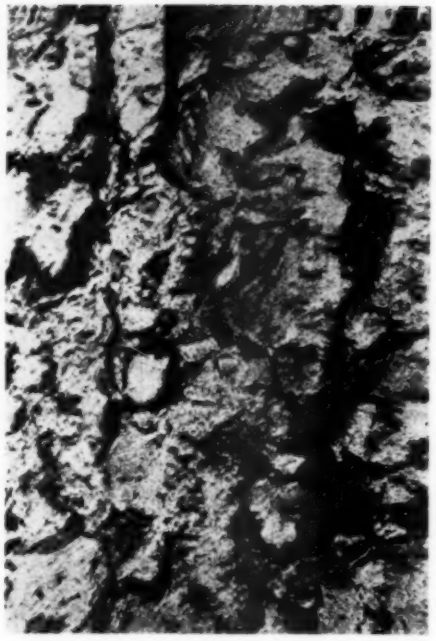
PHYSICS

Electron Microscope Pictures May Be Sent By Television

New Combination With Radio Facsimile Attachment Has Many Unexplored Uses; Now Used To Study Metals

ELECTRON microscope pictures transmitted by television may be one of the future uses of a new scanning microscope now, however, devoted to metallurgical studies to produce better metals for America's war industries.

The new instrument was described by Dr. V. K. Zworykin, associate director of the RCA Laboratories, in a paper read at the Institute of Radio Engineers meeting in Cleveland. Dr. James Hillier and Richard L. Snyder, also of the RCA Laboratories, collaborated in the development of the instrument.



ETCHED NICKEL

This picture was made by the facsimile printer of the new televising electron microscope and shows what the surface of etched nickel looks like.

THE SCANNING ELECTRON MICROSCOPE

This instrument scans the specimen television fashion and then builds up its picture on a fluorescent screen. The light from this is then focussed on the sensitive element of a facsimile printer where a print is made. This set-up is especially adapted to examining the surface grain of metals and other opaque objects. The scientists are left to right Dr. James Hillier in the foreground, Dr. V. K. Zworykin and Richard L. Snyder, all of the RCA Laboratories, who developed the instrument.

The scanning electron microscope, developed over a period of years, combines the electron microscope, television and radio facsimile. It permits study of the grain structure of opaque objects, such as metals, to an order of minute detail never before realized. The full range of its possible uses cannot be judged at this time, Dr. Zworykin cautioned.

In the ordinary electron microscope, the electron beam, like the light in an optical instrument, throws an image of all parts of the object simultaneously on the fluorescent screen. In the scanning instrument, the beam is narrowed down to a spot no more than 1/2,000,000 inch (100 Angstrom units) in diameter — about 1/1,000 the size of a pin point. This tiny spot sweeps back and forth over the specimen, itself only a fraction of an inch in size, scanning it as in a television transmitter, and builds up the image on the fluorescent screen in successive parts. Great difficulties were encountered in obtaining and handling this sub-microscopic spot, Dr. Zworykin said, but they were overcome.

In the present arrangement, the light from the fluorescent image, now ordinary light, is concentrated by an optical lens on the photo-cathode of an electron mul-

tiplier which operates a facsimile printer.

Only a few days before at the Penn State College meeting of the American Physical Society, Dr. Hillier, R. F. Baker and Zworykin announced another major improvement in electron microscopes. (See following article.)

Science News Letter, July 11, 1942

PHYSICS

Electron Microscope Now Analyzes Molecular Structure

Adapter Applied to Standard Instrument Converts It To Diffraction Camera; Can Be Used on Same Specimen

See Front Cover

THE ELECTRON microscope can now not only make an enormously magnified picture of a minute object but also peer into its insides and determine its molecular structure. You cannot see the atoms but you can find out where they are.

This of course could be done before by means of another instrument, the diffraction camera, using either X-rays or electrons. But now an "adapter" applied to the standard commercial electron microscope, quickly converts it to a diffraction camera, thus dispensing with the second instrument and with a second source of radiation.

Within a few minutes of each other a picture and a diffraction pattern of the same specimen can be made without remounting it, without removing it from the vacuum, and without tampering with it in any other way. In many fields of investigation this is a great advantage.

How it is done was described by Dr. J. Hillier, R. F. Baker and Dr. V. K. Zworykin of the Research Laboratories of the RCA Manufacturing Company, Camden, N. J., at the meeting of the American Physical Society at State College, Pa.

To pass from microscope to diffraction camera, it is only necessary to shift the position of the specimen in the tube, which is done by gadgets on the outside, and to change the lens. The latter is easy. An electron lens is merely a coil of wire in which an electric current is flowing. When the current stops, it ceases to be a lens. Hence, to switch from the projection lens which makes the picture to the lens which produces the diffraction pattern, it is only necessary to switch the current from one to the other.

The instrument is so arranged that diffraction patterns can be made either by transmitted light or (for opaque objects) by reflected light. For the latter the specimen is turned so that the electrons are reflected at a grazing angle. Provision is also made for rotating the specimen in its own plane, which is useful in making diffraction patterns.

The diffraction pattern produced in this way is a set of concentric circles, some sharp, some diffuse. From dimensions and intensities, the arrangement of the atoms in the material can be determined.

The incorporation of the adapter in the standard instrument does not increase its dimensions nor interfere with its functioning as an electron microscope, the scientists said. But it does considerably widen the usefulness of an already widely useful tool, saves time, expense and labor, and makes it possible to investigate materials that change.

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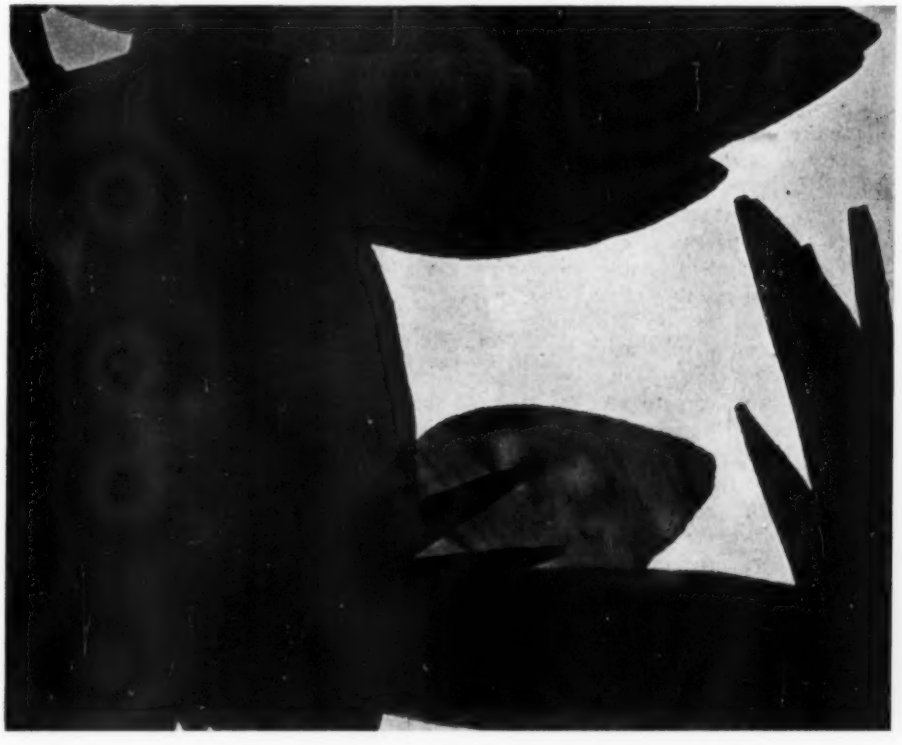
MEDICINE—PHYSICS

Electron Microscope Shows Germ Killers at Work

THE ELECTRON microscope, science's latest weapon for seeing the invisible and peering into the structure of life, now promises to show just what happens to an individual disease germ when it is attacked by a germ-killing agent such as bichloride of mercury.

First studies along this line will be reported by Dr. Stuart Mudd, of the University of Pennsylvania, and Dr. Thomas F. Anderson, of the RCA Manu-



ELECTRON MICROGRAPH

Each of the large dark masses in this picture is a tiny speck of aluminum oxide no larger than the point of a needle. The electron microscope has magnified these specks 40,000 times. When the microscope is changed over to a diffraction camera, the pattern shown in the picture on the front cover of this week's SCIENCE NEWS LETTER is produced by the same substance.

facturing Company (*Journal of Experimental Medicine,* July).

When a typhoid fever germ is mixed with silver nitrate, the flagella which serve the germ as propellers are completely destroyed, the electron microscope revealed. The protoplasm, which is the very life of the cell, is stained black, but the wall of the cell is apparently unaffected. The entire germ is very much smaller, as if shrunken.

When the typhoid fever germ is mixed with lead acetate, however, the flagella, though darkened, are not destroyed. The germ swells, however, and its protoplasm escapes its wall to form a halo around it.

Differences in action of lead, silver, nickel and mercury salts were also observed on cholera and dysentery germs and on a microorganism called *Fusobacterium.*

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ENGINEERING

Automobile of the Future Will Be Lighter and Cheaper

Weight Would Be Reduced as Much as 1,000 Pounds; Eventually Engine May Be Placed in the Rear

WHEN the cessation of hostilities at last permits the manufacture of automobiles to be resumed, the new cars will be smaller, lighter, lower, cheaper and more economical than present ones, and some radical new designs with engine in the rear may be seen.

This is the concensus of engineering opinion as gathered by Frank Jardine, chief engineer of the Castings Division of the Aluminum Company of America (*Society of Automotive Engineers Journal,* July).

The first post-war autos, he warned however, will probably be similar to the 1942 models, and more expensive. Time will be required to develop the drastically changed new models, and meanwhile parts, tools and machinery already on hand will have to be used. Nor may we expect new cars to run off the assembly line the moment hostilities cease. Time is also required to change from war-time to peace-time production.

Here are some of the ideas of automotive engineers regarding the future car. But Mr. Jardine also warns that future events may require some considerable revision of present day ideas.

While everyone was agreed that the new cars would be cheaper, there was much variation as to actual prices. In the low price range, the average was $700 for a car that would do 30 miles on a gallon of gas. The larger cars averaged $2,000 and 20 miles to a gallon of gas. These economies would be required to offset higher gas taxes. Regular fuel would be 80-octane, premium fuel 100-octane.

Weight of the cars would be reduced by as much as 1,000 pounds in some cases without reducing size.

The engineers believed that there would be extensive use of substitute materials developed during the war, with savings in weight and cost and in many instances with mechanical improvement. Increased production of aluminum and magnesium would permit greater use of these light-weight materials. Plastic windshields curved at the corner posts will permit better seeing. Tires will be about the same but may be of synthetic or natural rubber.

Hydraulic drives and brakes, automatic transmissions and overdrive will definitely appear on all but the low-priced models.

Engines will be smaller and lighter in weight. Carburetors will probably not be changed, but superchargers and fuel-injection systems may be developed. Eventually the engine may be placed in the rear.

These are some of the specifications for the future car as dreamed by present-day engineers, but subject to future revision.

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ANTHROPOLOGY

Anthropological Bases Lacking for "Race" Claims

RACIAL claims made for propaganda purposes lack any semblance of biological or anthropological basis, Dr. John R. Swanton, veteran anthropologist of the Bureau of American Ethnology, indicates in a new publication of the Smithsonian Institution.

Even the earliest nations, like Egypt and Babylonia, show no absolute uniformity in racial types, says Dr. Swanton. They were at least two distinct physical types in ancient Egypt in addition to the Mediterranean type commonly thought of as representing the Egyptian "race." As for modern Germany, few of the larger nations of history have less title to a mystical national unity, despite the vehemence of Nazi claims.

On the other side of the picture, Dr. Swanton finds racially homogenous groups of people who never achieved common nationality or political organization. It was so to a considerable extent in ancient Greece; even more so among some tribes of recent Indians on this continent. New England and New York Indians were very much alike physically, yet they had widely divergent tribal organizations and even radically different languages.

"In short," says Dr. Swanton, "there is no one universally valid principle identifying a body of people as a tribe, and tribes or tribal groups varied so enormously as to dispose effectually of the idea that there was an immutability about them, either in their origin or later development. Sanctions of supernatural character were claimed in the more developed tribes such as the Natchez, Aztecs and Incas, but these were plainly afterthoughts intended to stabilize a condition brought about by less occult means."

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NUTRITION

Dehydrated Beef Now in Production for Lend-Lease

DEHYDRATION, the process that makes one ship do the work of half-a-dozen or more in getting vegetables, eggs and milk overseas, is now at work on meat as well, announces Secretary of Agriculture Claude R. Wickard. Experiments have been under way for some time, and the technique has progressed far enough to justify its use with beef. Experimental work on pork dehydration is still in progress, and is regarded as promising.

The beef is ground before dehydration, so that the product, after "re-hydration," is most suitable for meat loaf, meat pie and croquettes. A coarser grind gives meat suitable for stews. The product is reduced about three-fourths in weight, and about one-half in bulk.

At present production is limited.

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MEDICINE

Anthropologists Object to Segregation of Blood in Banks

Policy Called Unscientific Because of Lack of Any Evidence That Blood of Negroes Differs from Whites'

OPPOSITION to the segregation of bloods from Negro and white blood donors in blood banks being collected under the auspices of the American Red Cross is expressed by the Committee on Race Relations of the American Association of Physical Anthropologists.

Members of the committee include: Dr. William K. Gregory, of the American Museum of Natural History and president of the American Association of Physical Anthropologists; Dr. Harry L. Shapiro, also of the American Museum of Natural History; Dr. Franz Weidenreich, formerly of Peking Union Medical College and now working at the American Museum of Natural History; and Dr. W. W. Greulich, of Western Reserve University School of Medicine and director of the Brush Foundation.

The committee, in a report in the current issue of the *Journal, American Medical Association* (July 4), gives three reasons for opposing the segregation of bloods.

First, it is pointed out, "There is no evidence that the blood of Negroes differs in any significant respect from that of white persons."

The objection to indiscriminate use of Negro blood because of "the somewhat higher incidence of syphilis among Negroes" is met by the explanation that preliminary tests rule out syphilis in blood accepted for the blood banks and if, in spite of this, syphilitic blood were accidentally included the germs would be killed by the procedures used in preparing and preserving the dried blood plasma or serum.

"This policy of the American Red Cross appears even more indefensible when one considers the origins of some of the substances which are widely and effectively used in modern medical practice and which are readily accepted by the patient."

This refers to the use of preparations from animal glands for treatment of diabetes, Addison's disease and pernicious anemia, the use of blood from various animals for protective vaccines and serums and the use of sex hormone preparations from the urine of stallions and pregnant mares.

The former widespread custom among "the better circumstanced families" in the South of using Negro women as wetnurses is recalled by the committee with the comment that along with the nutritious elements of the milk the white babies certainly imbibed many of the same substances that were circulating in the blood of the Negro wetnurses.

"It is most unlikely that it did them any harm" the committee declares.

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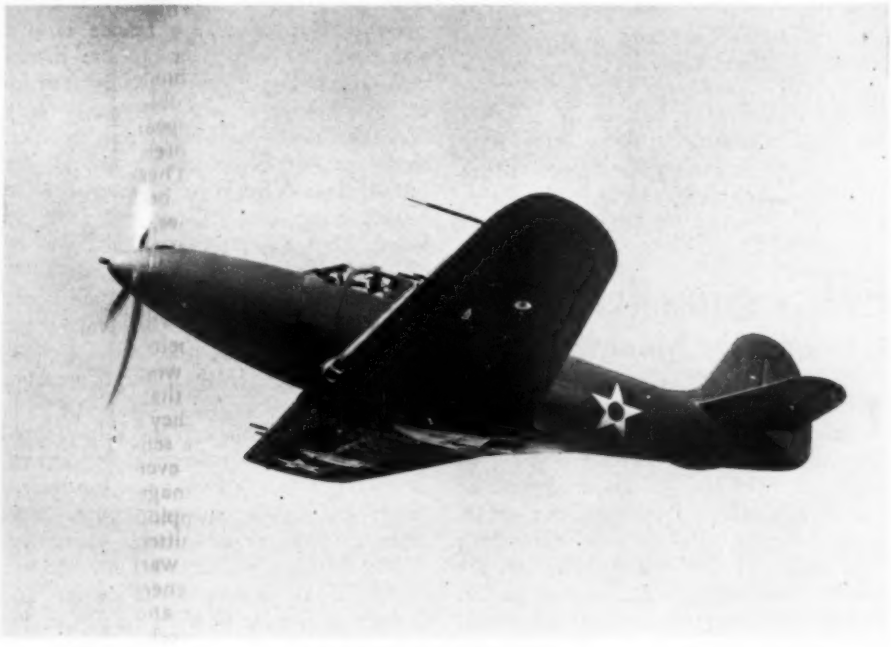

BELL AIRACOBRA

Here is a picture of the latest Army P-39—the type which has been credited by Lieutenant General H. H. Arnold with "magnificent" performance in the fighting off the Aleutian Islands. The odd-looking things hanging down beneath the wing are for the attachment of an auxiliary fuel tank for extended range.

A new type of *pectin* is reported to be experimentally successful in solutions of 50% sugar; present types require a 65% sugar solution.

Harpooned *swordfish* sometimes launch themselves against the dory boats manned by their captors, the attack sending the "sword" as far as 30 inches into the boat.

Between 300 and 400 tons of *herbs* are now being collected from England's hedgerows and fields, to save shipping space which the imported drugs used to occupy.

Great quantities of *cattle feed* are made from the by-product pulp and peel of citrus fruits, and a secondary by-product, the press juice, may soon be used to manufacture alcohol.

● RADIO

Saturday, July 18, 1:30 p.m., EWT

"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Captain Ralph T. Millett, A. W. S. Officer in charge of the Ground Observer Corps, First Fighter Command, U. S. Army Air Forces, will talk about model airplanes.

Tuesday, July 14, 7:30 p.m., EWT

Science Clubs of America programs over WRUL, Boston, on 6.04, 9.70 and 11.73 megacycles.

C. Russell Mason, secretary, Massachusetts Audubon Society, will talk on "Why Do Birds Quiet Down in Summer?"

One in a series of regular periods over this short wave station to serve science clubs, particularly in the high schools, throughout the Americas. Have your science group listen in at this time.

ASTRONOMY

Amateurs Watch Famous Variable Star SS Cygni

"THE NIGHT has a thousand eyes" is strikingly true today, for all over the world, even in war-torn and curfewed countries, amateur variable star observers are keeping their vigil of those fickle stars known as variables. This is reported by Leon Campbell, recorder of the American Association of Variable Star Observers.

The light variations of the unpredictable star called SS Cygni, have been watched continuously since the star's discovery by Miss L. D. Wells at Harvard in 1896. Since then, nearly 60,000 estimates of this star's brightness have been received, representing the observations of over 500 observers, some of whom have watched the star for 20 years or more.

Normally a 12th-magnitude star, about every 50 days SS Cygni bursts forth and becomes 20 or 30 times brighter, reaching nearly the 8th magnitude. Over 330 such outbursts have been recorded, some lasting only a few days, while others stretch over several weeks. But in 1933-34, the star decided not to follow its usual pattern at all. Although there are many stars somewhat like it, SS Cygni is a real mystery to astronomers, who are hard put to it to find an explanation for its peculiar behavior.

Meanwhile, the variable star observers, all of them amateurs, keep up a constant watch of this and over 500 other stars, supplying valuable records for theoretical astronomers to ponder over.

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ORNITHOLOGY

Bird Raises Umbrella Over Its Head When "Mad"

A BIRD that raises a feather umbrella over its head when it "gets mad" is due to become a resident of the New York Zoological Park some time this summer. Charles Cordier, collector for the Zoo, reports from Costa Rica that he has succeeded in capturing and taming a pair of umbrella birds, which he will bring with him on his return to this country. This species, though well known to scientists, has never been seen in captivity anywhere in the world, so far as available records show.

The umbrella bird is a good-sized sooty-black bird, about ten inches in height. Its chief point of interest is its umbrella-shaped crest of feathers, which it expands when it is annoyed or angry.

Mr. Cordier had trouble in securing his specimens. When he arrived at the almost inaccessible uplands where the birds live, he found that the nets he brought with him were not of the right size for their capture. So he used bird-lime, a sticky stuff that holds birds' feet as flypaper catches flies.

The first bird he captured, after three weeks of effort, got away, Mr. Cordier reports:

"After cleaning the bird for an hour, I tied its wings up with adhesive tape from a five-and-ten cent store, and the bird got away in a fraction of a second."

On the same day, however, he captured a female bird, and a few days later a fine male, which he fed by hand for ten days until it got over its initial fright and began to feed on wild berries. It is now quite tame.

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AGRICULTURE

Sandblasting Becomes "Ersatz" for Chlorine

SANDBLASTING may become the the wartime "ersatz" for the chlorine bleaching process used in preparing California walnuts for market. Bleaching is done not merely to make the walnuts look more attractive, but to disclose shell defects not visible on unbleached nuts. The fruit products laboratory of the University of California College of Agriculture is now working on the sandblasting process. It bleaches the shells satisfactorily; the problem now is to keep fine sand grains from sifting into the nuts through cracks in the shells.

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SEISMOLOGY

Chilean Earthquake Centered in Mountains

THE EARTHQUAKE felt in Santiago, Chile, on Monday, June 29, had its epicenter in the mountains about 80 miles south of the city, seismologists of the U. S. Coast and Geodetic Survey informed Science Service after examining data obtained by observatories of the Jesuit Seismological Association at St. Louis University, St. Louis, Mo., and Georgetown University.

The epicenter was located near 34.5 degrees south latitude, 70.5 degrees west longitude. The shock, which was described as "strong", began at 2:26.4 a.m., E.W.T.

Science News Letter, July 11, 1942

IN SCIEN

MEDICINE

To Keep Young-Looking Go in For Lots of Rest

IF YOU want to keep young-looking and fit after forty, forget about the wrinkle creams and the face masks and the daily dozen of exercises. Go in for rest. Learn to conserve your strength. Remember how grandmother used to preach the virtue of a "beauty nap" before a big party? There are few big parties now, but even before the war few spared time for a beauty nap.

Maybe you have seen pictures of primitive women, in tribes where the men hunt and loaf and the women do all the work. You could hardly believe that the wrinkled, dried skin and dull eyes belonged to a woman who was really young in years, probably half the age she looked. She furnishes excellent proof of the premature breakdown of living cells, Dr. Peter J. Steincrohn points out in his new book, *You Don't Have to Exercise* (Doubleday Doran).

Loss of youthful appearance is just one result of such a premature breakdown of living cells. These cells make up every part of the body, not only the skin, but the bones, the muscles, the heart and blood vessels and all the rest. If you drive yourself to work like a pack horse, you will not only look old before your time, you will feel and be old and perhaps die before your time.

Very few American women do heavy physical labor such as that done by the primitive woman. But they may be working just as hard, in the sense of expending as much energy, even if they do nothing more than manage a household with servants, go shopping, or perhaps serve on a few committees. And after forty, Dr. Steincrohn warns, we must learn to conserve our energy to remain young looking, healthy and fit.

All of us must work harder and longer than ever now to help win the war. This is all the more reason for conserving every bit of energy, for avoiding unnecessary exertion such as setting-up exercises or strenuous gymnastics, and for planning our days to give more time for rest which renews our strength.

Science News Letter, July 11, 1942

NE FIELDS

METEOROLOGY

Stalin as Young Man Was Observatory Assistant

JOSEPH STALIN was a junior scientist for a few years when he was a very young man, serving at the Tiflis Observatory, in his native Georgia, as meteorological and magnetic assistant during the years 1898-1901. Stalin was born in 1879.

The notebooks made by the young observer Stalin are still in existence, and are carefully treasured now as prime exhibits for a museum of the history of science in the USSR.

This almost forgotten chapter in the Soviet leader's history was made known by Dr. John Fleming, director of the Department of Terrestrial Magnetism, Carnegie Institution of Washington. The information came by way of London, as a result of the visit there of Dr. N. W. Pushkoff, leading Russian researcher in terrestrial magnetism, on a scientific mission. Dr. Pushkoff told the story to an English colleague, Prof. Sidney Chapman of the Imperial College of Science and Technology, who transmitted it to Dr. Fleming for publication in the *Journal of Terrestrial Magnetism and Atmospheric Electricity*.

Prior to the attack on Russia by the Nazis a year ago, Dr. Pushkoff disclosed, a plan approved by Stalin was under way for the establishment of a national geophysical observatory, patterned after the Carnegie Institution's laboratory. Outbreak of hostilities necessitated postponement of organization and building until after the war.

Science News Letter, July 11, 1942

ASTRONOMY

Arizona Astronomer Finds Atmospheric "Window"

A NEW "window" in the atmosphere has been discovered by Dr. Arthur Adel, of Lowell Observatory. To the American Astronomical Society he has reported the extension of the observable spectrum in the infra-red region from wave-lengths 14 mu (one mu is a millimicron or a millionth of a millimeter) to 24 mu, or nearly a whole octave.

Until recently, the long wave-length limit for which we could observe the spectrum of the sun was 14 mu. In July, 1941, Dr. Adel discovered a new spectral region of atmospheric transparency which allowed the obtaining of the sun's spectrum down to 24 mu. This discovery concluded a search he had begun in 1935.

Because of its high density, the atmosphere effectively absorbs great quantities of the light and energy we receive from the sun and the stars. In some cases it does this selectively, that is, for just certain wave lengths of the incoming light. The absorption is accomplished by nitrogen, oxygen, water vapor, and carbon dioxide. The bands of water vapor and carbon dioxide are particularly strong in the infra-red region of the spectrum; however, Dr. Adel has been able to pierce this "fog" in at least this one region.

Science News Letter, July 11, 1942

INVENTION

Seaplanes May Refuel From Floating "Bubbles"

QUICK refueling for submarine-hunting seaplanes and other aircraft is made possible by small filling stations that float on the sea like buoys. These are an invention of two officers of the U. S. Navy, Comdr. Paul E. Pihl and Comdr. Charles F. Coe, who have been awarded U. S. patent 2,287,824.

Time is lost in refueling seaplanes directly from their tenders, because of the small number of aircraft that can come alongside at one time. To obviate this, the two Navy men have devised a balloon-like fabric bag, impregnated with rubber or other waterproof material, into which the gasoline can be poured from the tanks of the tender. It is then lowered into the sea, where it floats like a bubble because gasoline is lighter than water. A suitable anchor keeps it from drifting.

One seaplane tender can fill and set out any desired number of these gasoline "bubbles", at such intervals that the seaplanes can settle down, suck their respective bubbles empty, and take off again with a minimum of time lost.

To keep the balloons from sinking when empty, and also to make filling an easier operation, each one is provided with a flask of compressed carbon dioxide, which is released to keep it inflated and afloat. The balloons can be collapsed for more compact stowage on shipboard.

Science News Letter, July 11, 1942

BACTERIOLOGY

Agar, Laboratory Material Reclaimable for Re-use

AGAR, a jelly-like substance made from seaweed, has been one of the wartime casualties of the laboratory. It is practically a "must" material in certain kinds of laboratory culture, especially in bacteriology, so that the cutting off of its pre-war source, Japan, threatens considerable inconvenience to research workers.

Methods for reclaiming once-used agar for re-use are described (*Science*, July 3) by two Washington research workers who developed their processes independently of each other. The men are Dr. Alden F. Roe of the George Washington University School of Medicine and Dr. Howard I. Thaller of the U. S. Department of Agriculture laboratories at Beltsville, Md.

There are some differences between the two methods, but both share certain essential steps. The discarded cultures are killed by heating thoroughly in a pressure chamber (autoclave), then the melted agar is poured into vessels and the debris removed either by filtering or sedimentation. Finally the jelly-like substance is slowly dried until it is reduced to hard, half-horny sheets that can be stored indefinitely in a dry place. To re-use, it is boiled in water and cooled to the jelly form desired.

Agar has recently come into considerable demand for a "bulk-former" in certain kinds of medicine, but this use is of course stopped entirely now. Laboratory requirements have priority.

Some substitutes for agar have been found, though these are not yet wholly satisfactory to many bacteriologists. A certain amount is also being produced from seaweed in this country, but probably not enough to replace the former imports from Japan.

Science News Letter, July 11, 1942

CHEMISTRY

Chemical Industry Medal Awarded to Harrison Howe

THE 1942 Chemical Industry Medal, one of the highest honors within the gift of American applied chemistry, has been voted by the Society of Chemical Industry to Dr. Harrison E. Howe, editor of the American Chemical Society's journal, *Industrial and Engineering Chemistry*, and a trustee of Science Service. Formal presentation will be made in New York on Nov. 6.

Science News Letter, July 11, 1942

PSYCHOLOGY

Fitting Workers to War Jobs

Training Time in Critical Jobs Is Reduced by Selecting Men Already Skilled in Similar Occupations

By MARJORIE VAN DE WATER

WAR has taken men from the job of filling cream puffs in a bakery and put them to work filling shells or cartridge cases in a munitions plant.

Men can take their hands from the making of inner tubes and put those same hands and skills to work making rubber assault boats for invasion of enemy lands.

The mechanic who used to tinker with the engine of the family jallopy now adjusts the 400-horsepower engines of tanks.

Such dramatic change-overs will be made from all sorts of peacetime industries to the essential jobs of war. And it will be done at a minimum cost of time and without wastage of precious human resources, because of the careful plans already laid before Pearl Harbor by job experts of the U. S. Employment Service.

In time of peace, these experts prepared for war. Originally aimed at the world's recurring war against the great enemy, unemployment, a nine-year program of research on jobs was ready to go into immediate action when war came.

Now these job experts are able to tell the Manpower Commission just where to turn for labor trained in the peculiar skills of hand or eye or arm which are so needed for war production. Study of the jobs of war and the jobs of peace has revealed which are so closely related in terms of the human traits required that they can be grouped together in the same "job family."

A complete survey of available American manpower is being obtained through the Selective Service system. Forty million men of all ages from high school age on up to three score and five have checked a list of 189 jobs to indicate those for which they have any training or experience.

As listed on the Selective Service questionnaire, the jobs carry the names by which they are best known to the public. Actually the 189 job names include some 650 different occupations. The man who checks the term airplane mechanic may have worked at any of eight different jobs—all of them essential to war production and all facing a shortage of workers. Some of the job names listed are general enough to cover as many as 20 different occupations.

But many of those listed are related in the same job family. The man who checks "toolmaker" is also potential raw material for a job as a diemaker or an instrument maker.

And some of the jobs listed are not important at all in America's growing war industry. They are there because the qualifications for them are so much like those for jobs that are essential.

Closest job to that of the automatic screw machine operators needed so badly in war industries is found in the textile industry. There, screw machine operators are employed under many other different job names. You will find "textile machine operator" listed on the Selective Service occupations questionnaire.

To fill an essential job in a war industry, the first step of the government experts is to search the "family tree" of that occupation to see what related job in a non-essential peace industry employing large numbers of workers is the closest "cousin."

Often the non-essential "cousin" is so closely related that very little training is required before the men can step right into the essential war job.

Here is how the job experts, under the direction of Dr. C. L. Shartle, trace occupational families for this new sort of job genealogy.

First step was the setting up of a dictionary of "work done" verbs which would best describe the principal job of each occupation. Joining, heating, mixing, machining, rigging, measuring, spraying, designing and dyeing—these

PEACE JOB

In the morning, this young lady was using an electric screwdriver in the manufacture of toy locomotives. But Junior's train must be sidetracked for the duration. This skilled worker was "converted." See photograph on facing page.

are a few of the hundreds that will give you an idea of how they go. Then each of these is broken down into more specific tasks. Joining, for example, includes nailing, gluing, winding, welding, sewing.

After the related occupations are sorted according to the sort of work done, the next step is to sort them according to the kind of machine or tools used.

Third step is to find out the degree of accuracy required—is it a precision job or one that can be done slap-dash?

Fourth step is to find the answer to the question—what is required of the worker. Does he have to be strong, clever with his hands, have unusual eyesight, eye-hand coordination, or ability to follow complex written directions?

Fifth step is to consider the kinds of materials used in the work. To sew canvas is not quite the same as to sew silk crepe, and the surgeon who must sew up a wound has an altogether different job still.

When all this sorting has been done for the essential war job and for all the related occupations, the job expert is ready to prepare the job family tree. It appears finally in a series of tables. The first table includes all the jobs that are practically twin brothers to the war job that must be filled.

Little or no training would be required for the man who was taken from such a closely related job and put into the war job. Then, as we go down the family tree, succeeding tables include jobs differing from the key job at first only perhaps in a single characteristic, but later in more and more. All are, however, like the key job in some way or in several ways.

The job of gage inspector is one of the bottlenecks of manpower. The demand far exceeds the available supply. Yet to become efficient in all the phases of this job would require years of experience and training—years during which the war must be won.

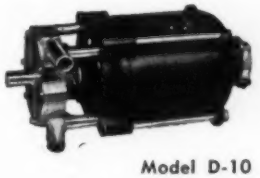
To short-cut the obviously impractical job of training raw recruits for this important job, the occupational experts worked out a family tree for gage inspectors including only those occupations which occur in industries that cannot continue peacetime production on account of shortages.

Four industries contribute to the first branch of most closely related occupations. These are jobs which involve precise measurements of materials, parts or assemblies, with the use of micrometers, calipers or gages and the reading of blueprints.

Stove manufacturing has a job called "atomizer specialist." Radio has what they call a "check inspector." Automobile factories employ "thickness inspectors" and "gagers." And the electric equipment industry has finishing inspectors, shaft inspectors, micrometer inspectors, circulating-process inspectors and raw material inspectors.

WAR JOB

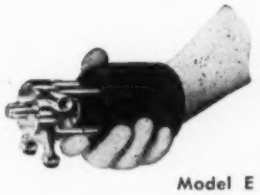
In the afternoon, the same girl pictured on the facing page was using the same tool on a war job. She was assembling parachute flare casings. These pictures are official Office for Emergency Management photographs.



Model D-10

"EXACTLY THE PUMP FOR OUR JOB"

That's what a plant executive told us recently. Why? Because we didn't "just sell" a pump. From our varied line we picked the model that fit the space available, was light in weight, and gave more than the required performance.



Model E

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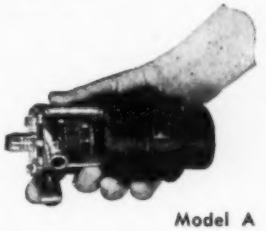

Model A

EASTERN

ENGINEERING COMPANY

70 Fox St., New Haven, Conn.

But stoves and console radios, automobiles and waffle irons are out for the duration. These workers are first line of supply now for war production.

Other occupations involve setting up or operating a precision machine for shaping metal products.

The clock and watch industry has men who can do these things—fox-lathe operators, underturners, and wheel cutters.

In a third branch of the family are the workers who test machines or mechanical assemblies for satisfactory performance. Two additional industries may be tapped for this group. The office machine industry has a business machine inspector. There is a refrigerator tester in the refrigerating equipment industry.

Ammunition factories need workers to operate automatic and semi-automatic machines for the loading of ammunition.

Closest cousins to these jobs outside the ammunition industry were found in such widely different industries as bakeries, grain and feed mills, tobacco factories, fertilizer plants, brick and tile works, bedspring factories, ice cream factories and canneries.

Science News Letter, July 11, 1942

METEOROLOGY

Aleutian Weather Is As Bad As Navy Men Say It Is

Weather Bureau Records Show It To Be One of the Drizzliest Places on Earth With Rainfall of 71 Inches

ALEUTIAN island weather is fully as bad as Navy men say it is, examination of published records of the U. S. Weather Bureau shows. It's the kind of thing we hear about Iceland—plus.

It must be one of the drizzliest places on earth. The observatory on Attu, one of the islands reported seized by the Japs, shows a mean annual rainfall of about 71 inches, which is not at all terrific so far as total precipitation goes. Annual rainfall along the Atlantic coast near Washington runs about 50 inches. But the total number of days on which measurable rainfall occurred was 200 out of the 365. That means an endless procession of little rains. And it doesn't count heavily cloudy days on which no rain occurred; neither does it count fogs that put no water in the rain gauge.

It never gets very cold in the Aleutians—and it never gets warm. Zero Fahrenheit has never been reported; the thermometer in winter hovers constantly near freezing point, but seldom dips below it. Summer temperatures average a trifle under 60 degrees, and rise to near 70 so seldom that such days don't figure in tabulation of averages.

While frosts have been recorded during every month except July, they are uncommon in summer. Frost-free season extends from late May until early October. This gives a growing season actually longer than that of some of the northern states, the Weather Bureau comments, adding: "However, owing to the large amount of cloudiness and the comparatively low summer temperatures, vegetation, except native grasses, makes slow growth, and gardens are not much of a success." Orchards and forests would be even less of a success, apparently; the natural vegetation of the islands includes no tree species whatever.

The climate of the islands, however dull, is not without its exciting spells of weather. Cold water of the Bering sea on one side, warm water brought up from subtropical Pacific areas by the Japan current on the other, set up contrasts that breed all manner of storms. Many of the cyclonic disturbances that sweep down across North America originate here, or take on their characteristics after emerging as "young" storms from Siberia across the way. There are also the notorious local "williwaws" violent windstorms in which the air currents seem to blow "every-which-way."

The Japs chose the best of a bad lot of weather to make their onfall in the western Aleutians. Weather Bureau records show that least rain, and most of what little sunshine there is, come in June and July. After the days grow short and early fall sets in, the place gets really nasty.

Science News Letter, July 11, 1942

LEARN SPANISH
THE LANGUAGE OF TOMORROW'S BUSINESS
BY
PLAYING CARDS
It's easy to learn to speak, read and write Spanish this popular new way...and it takes only ⅓ of the time usually required to master a foreign language. Play Solitaire or play the Course with a member of your family or while you entertain friends. Prepares for the thousands of post-war opportunities that will be available to Spanish-speaking men and women when trade with our Latin-American neighbors is at its peak. Remember...2, 3 or 4 persons can learn at no extra cost. 4 decks of cards and Cloth-Bound Text Book, only $2 postpaid.
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PSYCHOLOGY

Protecting Children From War Fears Is Advised

SPECIFIC measures parents can take to protect their children from being badly upset by the war and its anxiety were given by Dr. Bert I. Beverly, chief of the Rush Medical School Behavior Clinic, Chicago, at the meeting of the American Academy of Pediatrics.

First, parents must remember that every child, from the baby in his cradle to the big boy or girl in high school, will be upset if his parents are. Instead of hiding their quite natural fear and worry over the war, parents should frankly tell the children of the possible dangers, as far as they are able to understand them, and should explain just what is being done for the family's safety.

Every effort should be made to keep young children with their parents. In case of fires, blackouts and bombings, Dr. Beverly says, the children feel safe only when they are very close to their parents. Identification tags to avoid the loss of parents in blackouts are advised.

"When father is away from home, in part or all of the time, mother can give the children security if there is a well thought out and organized plan whereby everyone knows what to do in case of emergency and the children are sure mother will be there to see that everything is all right," he continued. "In the absence of both parents, children can be made to feel certain that a mother substitute knows exactly what to do and they can be close to her in case of emergency."

Don't tell a frightened child that he is silly. Encourage his sense of responsibility by giving him something sensible and useful to do.

Science News Letter, July 11, 1942

Bombers from the Bottom of the Deep Blue Sea

THERE'S a fabulous amount of magnesium in every cubic mile of sea water.

Enough magnesium for more than *four million* Flying Fortresses. Enough to lay a continuous ceiling of bombers . . . a hundred miles wide and stretching all the way from London to Berlin!

Now magnesium can't be dredged out of the ocean . . . for every ounce of this rare metal must be produced by electrolysis. This necessitates the conversion of vast amounts of alternating current to direct current, at the very water's edge.

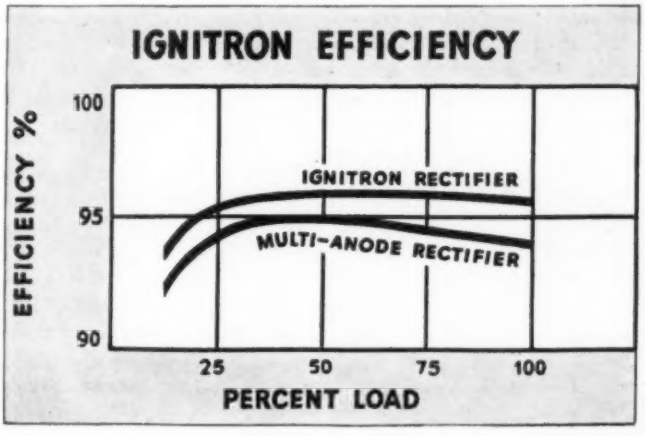
The best means of converting power is the mercury arc rectifier. As long as ten years ago, Westinghouse Research Engineers began experimental work on a *new type* of mercury arc rectifier which would be more efficient . . . more economical . . . less costly to install and maintain than existing types.

These Westinghouse scientists realized that new untapped fields in metallurgy would be opened by the perfection of an improved mercury arc rectifier. In 1937, they brought forth the *Westinghouse Ignitron.*

The Ignitron operates on the radically new principle of *starting* and *stopping* the mercury arc with each cycle. This means that electrodes can be placed much closer together . . . grids and shields reduced . . . arc drop voltage decreased . . . voltage control simplified . . . arc-back practically eliminated. And all of this assures higher efficiency and greater reliability.

More than 1,000,000 kw of Ignitrons are now at work in magnesium, aluminum and chlorine plants, in electric railway systems, in mines, in many war industries.

And so, the germ of an idea . . . born ten years ago in the Westinghouse Electronics Laboratories . . . is now contributing its important share in winning the war today.



Westinghouse

WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, PITTSBURGH, PENNSYLVANIA

NUTRITION

Mountains of Cabbage Dried For Lend-Lease Shipping

A HUNDRED tons of cabbage a day, with similar mountainous quantities of onions, garlic and other vegetables, are being reduced to the bulk-saving, weight-saving dehydrated form in California processing plants formerly devoted to drying fruits, E. M. Chace of the U. S. Department of Agriculture told the Institute of Food Technologists.

When the procurement officers for American armed services and purchasers for the lend-lease program made known their huge-scale requirements for dehydrated vegetables, the first response was the conversion of the large fruit-drying plants. Some new establishments have also been set up.

Mr. Chace, and also Prof. S. C. Prescott of the Massachusetts Institute of Technology, who spoke on the same program, warned against an over-enthusiastic rush to get into the food-dehydrating business, however. Several limiting factors impose themselves. Food dehydration is not the simplest job in the world, they agreed in declaring, and the number of men with adequate technical training is relatively small. Equipment also is a problem, because a certain amount of critical metal is needed for construction of a plant, as well as cutting and other processing machinery which may be difficult to obtain. Finally, despite the gargantuan requirements of Army, Navy and Lend-Lease, their buyers are not rushing into the market to grab up dehydrated foods no matter by whom offered.

Science News Letter, July 11, 1942

Recapped passenger tires lasting 10,000 miles and giving two years' service under wartime driving restrictions, are the aim of the Government's most recent tire conservation program.

ZOOLOGY

NATURE RAMBLINGS *by Frank Thone*

Fifth Columnists

RECENTLY a clever columnist, pouring indignant ridicule on government publications unrelated to the war effort, and hence (in his opinion) deserving of suppression, singled out one issued by the U. S. Fish and Wildlife Service, entitled *The House Rat*. A worse example for the support of his argument could hardly have been chosen.

If we had a band of fifth columnists in this country who succeeded in destroying a 10,000-ton cruiser every year, we'd call it a pretty serious loss. Rat destruction of property in American cities of 100,000 population and over is estimated at $20,000,000 annually by Henderson and Craig, in their book, *Economic Mammalogy*. That is approximately the pre-war cost of a heavy cruiser. Rat damage in Washington, D. C., alone is estimated at nearly $200,000 a year by the same authorities. That would just about pay for a Flying Fortress.

These figures are very conservative, in the estimation of other zoologists. And, of course, they do not take into consideration the immense destruction by rats in smaller places, and the even more important havoc wrought by these pests on farms, in grain elevators, on shipboard, and in Army and Navy storage warehouses. The Fish and Wildlife Service accepts a figure of $189,000,000 a year as probably a fair estimation of the rat damage to property in the United States. If we could only prevent that loss, we could keep ourselves very comfortably in new aircraft carriers without extra cost to American taxpayers.

Rats are targets of choice for a not inconsiderable professional group in this country, the vermin exterminators. These modern Pied Pipers welcome any scientific hints they can get that will help them in their business. It is a safe guess that the pamphlet in question will be well received by them.

Even more important than their destructiveness to property is the menace of rats to public health. The role of rat fleas as carriers of bubonic plague is well known. A recent article on Jungle Warfare, in the *Infantry Journal*, states that they also transmit several varieties of typhus fever and a tropical plague called fièvre nautique. These are things with which our troops now readying themselves for reconquest of the Indies will have to contend. It would seem, therefore, that any publication that will give information on how to combat rats is hardly one to "pick on" in war time.

Science News Letter, July 11, 1942

A sunken cargo of fighting *tanks*, recently hauled up from the ocean floor, is as good as new in spite of its salt-water dousing.

Tear gas, for testing gas masks, now is packaged in gelatine capsules similar to the ones that hold America's daily vitamins.

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New Machines And Gadgets

Novel Things for Wartime Living

Million-volt X-ray outfits of the compact portable type recently developed for industrial use are going almost into mass production. In the one short year since the first of these outfits was produced, 40 of these machines have been built. They can look through eight inches of steel in a few minutes, an operation previously requiring many hours, thus speeding up our war industries and making their products far safer.

Stainless-clad steel can in many instances replace solid stainless steel, thereby effecting a considerable saving of the latter for the war emergency. The thin layers of stainless give all the desired corrosion resistance. Stainless-clad sheeting has also been used in place of brass sheeting, thus effecting savings in a still more strategically valuable material.

An expansible dynamite cartridge obviates the necessity for slitting the wrapper—a sometimes dangerous operation—in order that the powder may spread out and fit the hole tightly when tamped. The new cartridge has a line of perforations in the inner wrapper extending spirally around the stick. When pressed with the tamping pole, the expanding powder tears between these perforations, the paper unwraps slightly and telescopes as the length of the cartridge is shortened. No powder is spilled, as happens with a slit cartridge.

Metal blackout awnings afford an ever-ready means of instantly blacking windows out completely and at the same time protecting the glass from flying debris. The awning is made of metal segments that telescope into small space when the awning is raised. When pulled halfway down, it serves as any other awning. When pulled all the way down, it covers the entire window in a semi-cylindrical form. Flexible gaskets prevent leakage of light between the segments. The curved outside surface prevents telltale reflection from the moon or other outside light.

The old tin grater can be added to the tin cans in your scrap collection heap. A plastic grater of transparent cellulose acetate can now be used—and looks better too.

Goggles for hot weather are shown in the illustration. The goggles, which are of the kind that can be individually turned up out of the way, are combined

with a sweatband in this newly patented invention. Thus perspiration is prevented from running down into the eyes or onto the glasses. To make more sure of this, the hollow channeled pieces above the glasses are stuffed with an absorbent material which can be renewed from time to time.

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington, D. C., and ask for Gadget Bulletin 112.*

Science News Letter, July 11, 1942

ANTHROPOLOGY

Ainu of Northern Japan Only Remotely Related to Us

JAPAN'S persecuted "white race," the hairy Ainu of the northern island, are not very closely related to the white peoples of Western lands, Academician L. Stenberg, noted Russian anthropologist, states in studies received by the Smithsonian Institution. Instead, they belong to a general "Caucasoid" complex shared with various peoples of southern Asia and Indonesia. They may even have some vague relationship to the bearded black natives of Australia, despite an almost exactly opposite difference in skin color.

The Ainu, who contrast sharply with the Mongolian race in their general hairiness and especially in their long, grandfatherly beards, live very primitively in the small area into which their Japanese oppressors crowd them. Despite their northern location, they keep many of the habits of a southern, seafaring people. The men go about in summer wearing only breechclouts, and some of their cultural practices resemble those of Polynesia.

Science News Letter, July 11, 1942

A newly discovered meteor crater contains an estimated six to seven thousand *meteorites,* with a total weight of about six tons.

FIRE!

DEEP-ROOTED in the customs of primitives, is the desire to set fires. Forest fires are often started by ignorant people who follow a tendency almost like fire worship. Even in the United States, a great many devastating forest fires are set by people of the region who are dominated by superstition rather than by science.

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Science News Letter, July 11, 1942

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